

A List and New Distributional Records of Pacific Coast Odonata

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In the course of considerable field work and examination of insect collections in the Pacific states (Washington, Oregon and California), we have accumulated records of a number of species of Odonata that extend their known ranges. Species lists with little detailed information on distribution were published for California (Smith and Pritchard, 1956) and Washington (Paulson, 1970). Virtually nothing has been written about the Odonata of Oregon since the excellent papers by Kennedy (1915, 1917), which remain the basic references for these states. The following list includes only those records that are the first for a state or that substantially extend the known limits of distribution of a species. Some species were included on the California list by Smith and Pritchard (1956) on the basis of specimens in the University of California, Berkeley, and California Academy of Sciences collections rather than published records (R. F. Smith, *in litt.* to Paulson, 22 November 1974), and we present herein distributional data for these species. In addition, we question the presence of several species in California.

We appreciate greatly the courtesies of the staff of the museums visited: Paul Arnaud and Carolyn Mullinex at the California Academy of Sciences (CAS); Jerry Powell and John Chemsak at the California Insect Survey, University of California, Berkeley (CIS); and Charles Hogue, Julian Donahue and Roy Snelling at the Los Angeles County Museum of Natural History (LACM). Specimens in a few other collections are cited, and the remainder are in our own collections (DRP, RWG). We have had considerable assistance in the field from the following persons: Mary Lynn Erckmann, Charles Turner, Elisabeth Schäublin, Eileen O'Connor, Paulette Bierzychudek and Cindy Power (DRP); and Jo Allyn Garrison (RWG). All of them made time in the field more pleasant as well as augmenting our collections.

CALOPTERYGIDAE

Hetaerina americana (Fabricius). CALIFORNIA, Siskiyou Co., Klamath River, 4.4 mi. W Cal. 263 on Cal. 96, 7 July 1974, 2♂ 3♀; Shasta River, 4.3 mi. N Yreka, 16 August 1973, 4♂ 1♀; 7 July 1974, 4♂ 3♀ (all DRP). Previous northernmost record Butte County (Kennedy, 1917).

LESTIDAE

Archilestes grandis (Rambur). CALIFORNIA, north to Ventura Co., Sespe Creek, 4.0 mi. N Fillmore, 4 October 1965, 1♂ (DRP); 24 October 1965, 1♀ (DRP); Riverside Co., Indio, 5 October 1918, 1♂ (CAS); and Tuolumne Co., near Groveland, 14 August 1954, 2♂ teneral (CIS). Listed from California by Smith and Pritchard (1956) but no previous records other than those before the confusion between *A. grandis* and *A. californica* was terminated (Kennedy, 1915). The record from Tuolumne County, in the foothills of the Sierras, is considerably northwest of a line drawn through the other northwesternmost records: Washington County, Utah (Brown, 1934) and SOUTH DAKOTA, Custer Co., stream 1 mi. W west entrance to Wind Cave National Park on U. S. 385, 4200', 26 August 1969, 1♂ (DRP).

Lestes congener Hagen. CALIFORNIA, San Diego Co., Cuyamaca Reservoir, 4600', 21 August 1974, 11♂ (RWG); 24 August 1974, 2♂ (DRP). Previous southernmost record Santa Clara County (Kennedy, 1917).

Lestes dryas Kirby. CALIFORNIA, San Bernardino Co., San Bernardino Mountains, South Fork, 6200', 30 June 1907, 1♂ (LACM); Barton Flats, 26 June 1936, 1♀; 1 July 1936, 1♀ (both CAS). Previous southernmost record Tuolumne County (Kennedy, 1917).

COENAGRIONIDAE

Amphiagrion abbreviatum (Selys). CALIFORNIA, San Diego Co., Laguna Mountains, 18 June 1938 (LACM). Previous southernmost record Fresno County (Kennedy, 1917). The species has not been recorded from Mexico, but there are numerous specimens from Baja California (DRP, CAS, CIS).

Anomalagrion hastatum (Say). CALIFORNIA, Imperial Co., canal 8 mi. E Holtville, 1 September 1967, 1♀; ditches near Imperial Dam, 23 August 1974, 4♂ 5♀ (both DRP). Known from the United States as far west as Reeves County, Texas (Johnson, 1972) and in western Mexico as far north as 15.6 mi. WNW Guasave turnoff on Mex. 15, SINALOA (DRP) but not from Sonora or Baja California. Thus this is a considerable northwestward range extension.

Argia agrioides Calvert. CALIFORNIA, many specimens and localities north to Siskiyou Co., Shasta River, 4.3 mi. N Yreka, 16 August 1973, 2♂ (DRP). This species, described from Baja California (Calvert, 1895), has long been confused with *A. nahuana*. Gloyd (1958) adequately differentiated the two species but stated that *agrioides* was confined to Baja California. Subsequently she has examined many California specimens (determinations in LACM and CAS) and confirmed specimens taken by Garrison in Arizona (*in litt.* to Garrison, 13 February 1977).

Argia emma Kennedy. OREGON, specimens from Douglas, Jackson, Josephine and Lake Counties (DRP). Previously recorded from Washington and California (Kennedy, 1915, 1917).

Argia lugens (Hagen). OREGON, Josephine Co., Rough and Ready Creek, 5 mi. S Cave Junction, 13 August 1971, 1♂ (DRP). Previous northernmost record Butte County, California (Kennedy, 1917).

Argia nahuana Calvert. CALIFORNIA, Siskiyou Co., Shasta River, 4.3 mi. N Yreka, 16 August 1973, 3♂ (DRP). Previous northernmost record difficult to determine, as Kennedy (1917) confused this species and *A. agrioides*, but his northernmost record of the combined species was from Butte County. Paulson has taken *agrioides* at five localities and *nahuana* at 14 localities in California with much overlap in distribution and co-existence at three sites.

Enallagma anna Williamson. OREGON, Lake Co., 1.0 mi. N Summer Lake, 15 August 1974, 1♂; Paisley, 15 August 1974, 2♂; CALIFORNIA, Lassen Co., 15.0 mi. N Susanville, 12 September 1967, 1♂; Long Valley Creek, 7.3 mi. SE Doyle, 24 August 1973, 9♂ 7♀ (all DRP); Plumas Co., Bucks Lake, 1 July 1949, 1♂ 1♀ (CIS); Inyo Co., Big Pine, 13 August 1955, 1♂; 4.6 mi. S Big Pine, 21 June 1973, 11♂ 5♀ (all DRP). Westernmost records for this species, which was recorded from California by Smith and Pritchard (1956) with no further locality records.

Enallagma basidens Calvert. CALIFORNIA, Imperial Co., ditches near Imperial Dam, 23 August 1974, 5♂ 1♀ (DRP). Originally described from Texas (Calvert, 1902), this species has undergone a dramatic range extension during the past 40 years (Montgomery, 1966), extending its distribution widely into the eastern states. It has been recorded previously as far west as Arizona (Johnson, 1972), and its spread toward the west has doubtless been possible by the increase in irrigation.

Enallagma civile (Hagen). CALIFORNIA, many localities through the southern part of the state north to Butte Co., Bidwell City Park by Big Chico Creek, Chico, 14 June 1975, 3♂ (RWG); Solano Co., 5.0 mi. W Vacaville, 18 October 1975, 14♂ 8♀ (RWG); and San Francisco Co., San Francisco, 27 September 1963, 2♂ (CAS). Listed by Smith and Pritchard (1956), but we have been unable to find a specific locality record in the literature. As it is now common in areas at which Kennedy (1917) collected but did not find it, it must be spreading into and within the state. It is one of the most characteristic species of disturbed habitats — irrigation ditches, reservoirs, cattle tanks — in the Southwest and should continue to increase with human modification of the entire area.

Enallagma clausum Morse. OREGON, Lake Co., Lake Abert, 15 August 1974, 2♂ 2♀; CALIFORNIA, several localities west to Siskiyou Co., Tule Lake National Wildlife Refuge, 8 July 1974, 2♂; and south to Inyo Co., Little Lake, 20 June 1973, 23♂ 6♀ (all DRP). These are westernmost records for this species, which was known from Yakima County, Washington (Kennedy, 1915) and California (Smith and Pritchard, 1956) with no specific locality records.

Ischnura barberi Currie. CALIFORNIA, numerous localities north to San Bernardino Co., Saratoga Springs, 10-12 July 1953, 1♂ (LACM); and west to Orange Co., Newport Bay, 5-7 September 1971, 9♂ 8♀ (DRP). Included in the key to California *Ischnura* by Smith and Pritchard (1956) but California not indicated in their account of its distribution.

Ischnura denticollis (Burmeister). OREGON, Lake Co., 1.0 mi. N Summer Lake, 15 August 1974, 4♂ (DRP). Previous northernmost record Butte County, California (Kennedy, 1917).

Ischnura perparva Hagen. CALIFORNIA, San Diego Co., San Diego, 10 August 1916, 1♀ (CAS). Previous southernmost record Tulare County (Kennedy, 1917).

Nehalennia irene (Hagen). CALIFORNIA, Lassen Co., Silver Lake, 26 July 1973, 6♀ (CAS). Closest known records Chelan County, Washington (Paulson, 1970) and Weston County, Wyoming (Bick and Hornuff, 1972). We consider the record from Santa Clara County, California (Seemann, 1927) very unlikely on ecological grounds.

Telebasis salva (Hagen). CALIFORNIA, Butte Co., Bidwell City Park by Big Chico Creek, Chico, 14 June 1975, 1♂ (RWG). Previous northernmost record Yuba County (Kennedy, 1917). *Amphiagrion abbreviatum* was also taken at the same locality, the first recorded instance of sympatry between these red species. *T. salva* occurs at low elevations in the Coast Range and Sierra Nevada foothills, while *A. abbreviatum* normally occurs at higher elevations in the Sierra Nevada and outlying southern California ranges. Chico, at 200' elevation, is considerably lower than Kennedy's (1917) record from Coulterville (1740').

Zoniagrion exclamationis (Selys). CALIFORNIA, Humboldt Co., Orick, 4 June 1931, 1♀ (CAS). Previous northernmost record Butte County (Kennedy, 1917).

PETALURIDAE

Tanypteryx hageni (Selys). CALIFORNIA, Napa Co., Samuel Spring, 13 May 1956, 1♂ (Univ. California, Davis); and above Pope Creek, 1 mi. W Lake Berryessa (near Samuel Spring), 30 May 1967, 3♂ (R. W. Cruden). These are the southernmost localities in the Coast Range for this locally distributed species.

AESHNIDAE

Aeshna canadensis Walker. WASHINGTON, Mason Co., Long Marsh, 5.2 mi. SW and 3.7

mi. N Belfair, 24 August 1971, 1♂; also several localities in Snohomish County (all DRP). Known from only the Spokane area in the state previously (Paulson, 1970), the present records the first from west of the Cascades in the Pacific states. Also recorded from southwestern British Columbia (Walker, 1958).

Aeshna constricta Say. WASHINGTON, Clark Co., pond just E Woodland, 10 August 1974, 1♀; also from Douglas, Klickitat and Yakima Counties (all DRP). Known previously from only the Spokane area in this state (Paulson, 1970); the Woodland record is the first from west of the Cascades. Unlike other northern *Aeshna* that occur in western Washington, this one is lacking from southwestern British Columbia (Walker, 1958), and the Columbia River rather than the Fraser River has probably provided it a route through the Cascades.

Aeshna eremita Scudder. WASHINGTON, Snohomish Co., near Monroe, 17 September 1974, 2♂ (DRP). Only previous record in Pacific states from Pend Oreille County (Paulson, 1970). As in *A. canadensis*, this species also occurs in southwestern British Columbia (Walker, 1958) but was otherwise unknown west of the Cascades.

Aeshna juncea (Linnaeus). OREGON, Clackamas Co., Still Creek Campground, 1 mi. SE Government Camp, 3800', 26 July 1973, 1♂ (RWG). Previous southernmost record King County, Washington (Paulson, 1970). Calvert's (1895) record from California probably refers to some other species of this group, perhaps *A. interrupta*.

Aeshna palmata Hagen. CALIFORNIA, San Diego Co., Indian Canyon, 20 July 1948, 1♂ (CIS). Previous southernmost record Santa Clara County (Kennedy, 1917). This record is surprising, as *palmata* is otherwise known from ponds at higher elevations, desert watercourses east of the Sierras and streams in the northern part of the state, and there has been considerable collecting in southern California with no additional records. Probably all extralimital records of well-known species based on single specimens should be treated with caution when assessing the distributional patterns of these species.

Aeshna tuberculifera Walker. WASHINGTON, Stevens Co., Hande Creek, 1.0 mi. S and 0.6 mi. W Middleport, 22 July 1973, 1♂; Twin Lake, SW of Middleport, 24 July 1973, 1♀ (both DRP). Previously known in the Pacific states from a single locality in western Washington (Paulson, 1970), this species was not expected east of the Cascades as it has not been reported from between the Great Lakes and Vancouver Island (Walker, 1958). The present records indicate the hiatus in its distribution may be more apparent than real.

Aeshna umbrosa Walker. CALIFORNIA, Sonoma Co., Annapolis, 23 September 1962, 1♂ (CAS); and Tulare Co., Sequoia National Park, near Tharp's Log, 1.5 mi. E Giant Forest, 6700', 27 July 1972, 1♂ (RWG). Previous southernmost record Tehama County (Roback and Westfall, 1967). The first locality furnishes the only known instance of sympatry between this species and *A. walkeri*, although their ranges overlap to some extent. Likewise, it is the only record of *umbrosa* away from the northeastern part of the state. See comments under *A. palmata*.

Aeshna walkeri Kennedy. OREGON, Lake Co., Crooked Creek, 5.0 mi. S Valley Falls, 15 August 1974, 9♂ 1♀ (DRP). Previous northernmost record Santa Clara County, California (Kennedy, 1917). The published records indicate a Coast-Range distribution, but in addition the species is locally common along the west side of the Sierras, whence we have specimens from Amador, Calaveras, El Dorado, Mariposa, Shasta and Tuolumne Counties. Kennedy (1917:587) listed *A. palmata* from the "colder streams of the Sierras," but we have found only *walkeri* on streams on the west slope. Both species were taken together on 16 August 1973 at the Shasta River, 4.3 mi. N Yreka, Siskiyou County (DRP).

Anax walsinghami McLachlan. CALIFORNIA, Shasta Co., Cayton, 19 July 1918, 1♂ (CAS). This is another surprising peripheral record, as the species is characteristic of the Sonoran region, the previous northernmost record being from Orange County (Seemann, 1927). Other species in the CAS taken at Cayton include *Amphiagrion abbreviatum*, *Argia vivida**, *Ischnura cervula**, *Aeshna multicolor**, *Ophiogomphus morrisoni*, *Cordulegaster dorsalis*, *Leptemis collocata**, *Leucorrhinia intacta* and *Sympetrum corruptum**, a mixture of mostly wide-ranging species. Those marked with an asterisk are known to occur with *walsinghami* farther south. Some support for the record is furnished by the occurrence of this species at an intervening locality, Del Puerto Canyon in Stanislaus County (RWG).

GOMPHIDAE

Erpetogomphus compositus Hagen. WASHINGTON, Grant Co., Crab Creek, 7 mi. NW Othello, 3-6 August 1972, 2♂; Benton Co., Yakima River, 9 mi. N Benton City, 16-17 August 1971, 1♂ 1♀ (all DRP). Listed for Oregon with no locality by Calvert (1905), the northernmost specific locality Butte County, California (Kennedy, 1917).

Gomphus olivaceus Selys. WASHINGTON, localities in Grant, Yakima and Benton Counties, from 10 July to 17 August (all DRP). Recorded from British Columbia (Walker, 1958) and California (Kennedy, 1917), this species had not been taken definitely in Washington at the time of compilation of the state list (Paulson, 1970). Kennedy (1917: 554) noted that exuviae reported by Needham (1904) from Seattle, King County, as *G. sobrinus* (= *G. kurilis*) are actually *olivaceus*, and Needham's illustration matches *olivaceus* better than *kurilis*, but we consider this record unlikely enough on ecological grounds to suggest that it not be given credence until confirmed.

Gomphus plagiatus Selys. CALIFORNIA, Imperial Co., Winterhaven, 5 September 1965, 3♂; 1 September 1967, 2♂ 1♀; canal 8 mi. E Holtville, 5 September 1965, 1♂, 1 September 1967, 1♂ 2♀ (all DRP). This species, recorded west to Texas by Needham and Westfall (1955), occurs west through southern New Mexico and Arizona into the southeastern corner of California and in northern Mexico at NUEVO LEON, Rio Las Lajas at Mex. 40, 2 mi. N China, 24 June 1965, 1♀ (DRP). California specimens are very much paler, both in intensity of color and extent of markings, than those from Florida, and central Texas specimens are intermediate in color between the two extremes. Material from California has the anterior pale areas of the thorax broadly confluent with the pale collar and keys to *G. olivaceus* in Needham and Westfall (1955). Western specimens also differ in size from Florida ones. Hind-wing lengths in millimeters of mature males are as follows, with the mean, range and number of specimens measured in order for each population sample: Florida — 35.3, 35-36 (7); Texas — 32.8, 32-34 (4); California — 32.6, 31-34 (7).

Ophiogomphus bison Selys. OREGON, Douglas Co., 10 mi. S Roseburg, 22 June 1960, 1♀ (CAS). Previous northernmost record Butte County, California (Kennedy, 1917).

Ophiogomphus severus Hagen. OREGON, Lake Co., Crooked Creek, 5.0 mi. S Valley Falls, 4500', 15 August 1974, 1♀ (DRP); CALIFORNIA, Modoc Co., Warner Mountains, 6 mi. E Fandango Pass, 20 July 1974, 1♀ (RWG). Previous southernmost record Umatilla County, Oregon (Kennedy, 1915).

Progomphus borealis McLachlan. CALIFORNIA, Napa Co., Pope Creek by Pope Creek Rd., 3.8 mi. W jct. Berryessa-Knoxville Rd., W of Lake Berryessa, 20 April 1975, 1 larva (RWG); Inyo Co., just S of Lower Haiwee Reservoir, 18 July 1961, 1♂ (DRP); end of Five Bridges Rd., 3 mi. N Bishop, 17 July 1973, 1♂ (RWG). These records are the farthest north in the Coast Range and the first east of the Sierra Nevada, respectively. Kennedy (1917) suggested that it did not occur immediately east of the Sierras, and La Rivers (1940, 1941) did not record it from Nevada. The original record from Oregon (Selys, 1873) has not been confirmed, but its occurrence in that state is likely, as it is common at Chico, Butte County, California (Kennedy, 1917; RWG).

CORDULEGASTRIDAE

Cordulegaster dorsalis Hagen. WASHINGTON, Klickitat Co., Brooks Memorial State Park, 11 August 1974, 1♂ 1♀; Asotin Co., canyon above Grande Ronde River, 2.5 mi. W Wash. 129, 28 August 1975, 1♂ (all DRP). No definite previous locality record in Washington (Paulson, 1970) but to be expected widely in light of its occurrence in southern British Columbia (Walker, 1958) and western Montana (Bick and Hornuff, 1974).

CORDULIIDAE

Epitheca canis McLachlan. WASHINGTON, King Co., 1 mi. S Duvall, 31 May 1969, 4♂ 3♀ (DRP). This species was not known from any definite locality in this state, although

recorded from "Washington Territory" by Muttkowski (1910).

Somatochlora albicincta (Burmeister). OREGON, Klamath Co., Winema National Forest, Johnson Meadow on Forest Rd. 2519, 23 July 1973, 1♂; Lane Co., Campers Lake, by Ore. 242, 5 mi. SW McKenzie Pass, 4700', 24 July 1973, 9♂ (both RWG); CALIFORNIA, Shasta Co., Summit Lake, Lassen Park, August 1952, 1♀ (CAS); Plumas Co., 0.5 mi. W Bucks Summit, 4 mi. SW Meadow Valley, 5000', 20 July 1973, 1♂ (RWG). Previously unknown south of the Washington Cascades.

Somatochlora walshi Scudder. WASHINGTON, Kittitas Co., lake at Hyak, 2500', 12 August 1975, 1♂ (DRP). Previously known only from Stevens County in northeastern Washington (Paulson, 1970) but expected in the Cascades from its occurrence in southwestern British Columbia (Walker, 1958).

LIBELLULIDAE

Leucorrhinia glacialis Hagen. WASHINGTON, Pend Oreille Co., Frater Lake, 6 mi. SW Tiger, 3400', 22 July 1973, 7♂ 2♀; Okanogan Co., Summit Lake on Mt. Hull, 4300', 2 July 1976, 1♂; Kittitas Co., lake at Hyak, 2500', 12 August 1975, 8♂ (all DRP). These records, from the northeast corner, Okanogan highlands and central Cascades, respectively, are the first for the state, as the previous record (Paulson, 1970) was based on the misidentification of a female *L. intacta*. Thus *L. glacialis* is not known from the western lowlands as indicated in that paper. It occurs in the Sierra Nevada (Kennedy, 1917) but is not yet recorded from Oregon.

Libellula croceipennis Selys. CALIFORNIA, Inyo Co., Antelope Spring, N of Cal. 168, 6 July 1974, 1♀ (RWG); Riverside Co., Riverside, 6 September 1938, 1♂ (LACM); Whitewater, 9 September 1935, 1♀ (LACM); San Diego Co., Vallecito, 16 September 1945, 1♂ 1♀ (LACM); Indian Canyon, 26 July 1948, 3♂ (CIS). Previously known north to Baja California and Oklahoma but not from Arizona or New Mexico (Needham and Westfall, 1955), it has subsequently been taken in Maricopa, Pima and Yavapai Counties in Arizona (RWG). The Inyo County record is well north of the other known localities.

Libellula julia Uhler. CALIFORNIA, Siskiyou Co., Castle Lake, 6000', 5 August 1953, 1♂; Tehama Co., Wilson Lake, 26 June 1960, 1♂ (both CAS). Previously unrecorded south of Washington.

Libellula luctuosa Burmeister. CALIFORNIA, numerous localities north to Siskiyou County and west to Napa County, 8 June to 18 August (RWG, DRP, CAS, CIS, LACM). Surprisingly, this species has not been recorded from the state before although listed by Smith and Pritchard (1956). Certainly it was not observed by Kennedy (1917) in his travels through central California. This indicates relatively recent invasion of the state, although the presence of a very distinctive population of this species centered around the Colorado River of California and Arizona (Garrison, 1976) may indicate long occupancy of that area.

Libellula nodisticta Hagen. OREGON, Lake Co., Lake Abert, NE side, 16 July 1974, 1♂ (RWG). Previous northernmost record Butte County, California (Kennedy, 1917).

Libellula saturata Uhler. OREGON, Josephine Co., Williams Creek, 0.6 mi. NE Provolt on Ore. 238, 6 July 1974, 1♂; pond at Provolt, 6 July 1974, 2♂ (all DRP). Previous northernmost record Tehama County, California (Roback and Westfall, 1967).

Macrodiplax balteata (Hagen). CALIFORNIA, Riverside Co., Salton Sea State Park near Mecca, 23 July 1961, 1♂ (Michigan State University); Whitewater River near Salton Sea, 22 August 1974, 1♀ (DRP). The published distribution of this species along the Atlantic and Gulf coasts from North Carolina to Florida and in the West Indies (Needham and Westfall, 1955) and Venezuela (Rácenis, 1953) furnishes no hint that it would occur in California. However, we have specimens from North Beach, Mazatlan, SINALOA, 31 August 1965 (DRP); San Felipe, BAJA CALIFORNIA, 31 October 1965 (DRP); and Graham, Maricopa and Yuma Counties, ARIZONA (RWG), indicating a much wider distribution. In addition, DRP saw a male at an *aguada* 8.8 mi. N Muna, YUCATAN, on 8 July 1965, indicating a probable distribution around the Gulf and Caribbean side of Middle America. *M. balteata* is primarily coastal and occurs at brackish ponds, which are not much visited by collectors of Odonata.

Orthemis ferruginea (Fabricius). CALIFORNIA, numerous localities north to Los Angeles and Riverside Counties, 18 April to 13 November (DRP, CAS, LACM). This is another of the species listed by Smith and Pritchard (1956) from California with no actual localities. It has been recorded as far north as Washington County, Utah (Musser, 1962), and there are two males from Indian Springs, Clark County, NEVADA, collected 25-26 May 1940 (CAS, CIS), a first record from that state.

Paltothemis lineatipes Karsch. CALIFORNIA, Madera Co., Big Sandy Flat, 15 July 1946, 1♂ (CAS). In addition DRP saw a male and a female on 18 August 1974 at a locality still farther north, Calaveritas Creek, 3.1 mi. SE San Andreas, Calaveras County. Previous northernmost record San Bernardino County (Needham, 1904).

Pantala flavescens (Fabricius). CALIFORNIA, Inyo Co., Little Lake, 3100', 11 September 1967, 1♂ (DRP). Also specimens from Los Angeles, Riverside and Imperial Counties (DRP, LACM). This species has been listed for California from at least the time of Muttkowski (1910), but we can find no specific locality records in the literature.

Pantala hymenaea (Say). WASHINGTON, Benton Co., Yakima River, 9 mi. N Benton City, 12 July 1971, 1♀; 16 August 1971, 1♀ (both DRP). In addition DRP has seen individuals at the following localities: WASHINGTON, Snohomish Co., slough 1 mi. E Cathcart, 10 August 1971; OREGON, Marion Co., north side of Santiam River at I-5, 13 June 1973; Josephine Co., pond at Provolt, 6 July 1974. Previous northernmost record Tuolumne County, California (Ahrens, 1938). This species is locally abundant in California and probably breeds in Washington, as the 16 August specimen listed above was quite young. It has probably increased greatly in recent years with irrigation of the Central Valley of California, as Kennedy (1917) listed it from only a single locality in central California, where it was uncommon.

Perithemis intensa Kirby. CALIFORNIA, Los Angeles Co., Wilson's Lake, Pasadena, 21 July 1900, 1♀; Riverside Co., Blythe, 30 July 1935, 1♀, 12 August 1938, 1♂ (all LACM). Only previous record from California in Imperial County (Dunkle, 1975).

Sympetrum illotum (Hagen). WASHINGTON, Klickitat Co., pond 10.2 mi. S Brooks Memorial State Park on U.S. 97, 11 August 1974, 3♂ (DRP); Yakima Co., 6.8 mi. NW White Swan, 3 July 1972, 1♂ (Washington State University). Previously known in Washington from only west of the Cascades (Paulson, 1970). A male from IDAHO, Shoshone Co., Wallace, 9 July 1938 (LACM) furnishes a first state record and considerable eastward range extension. Northern Idaho has much in common biogeographically with western Washington, and this record further supports the association.

Sympetrum internum Montgomery. WASHINGTON, Snohomish Co., Cedar Ponds Lake, 700', 17 September 1974, 1♂; Whatcom Co., Silver Lake, 3 mi. N Maple Falls, 750', 26 September 1974, 1♂ (both DRP). Previously unknown west of the Cascades in Washington (Paulson, 1970) but recorded from southwestern British Columbia (Whitehouse, 1941).

Tamea onusta Hagen. CALIFORNIA, Inyo Co., Little Lake, 3100', 20 June 1973, 1♂ (DRP). Previous northernmost record Los Angeles County (Calvert, 1906).

Deletions from California List

The following species have been reported from California in the literature but have not been convincingly documented, although a few of them may yet be found within its boundaries. Most are listed for the state by Smith and Pritchard (1956). No specimens from California of any of these species have been found in several major collections (University of Florida, Minter Westfall; and University of Michigan, Leonora Gloyd, both *in litt.* to Paulson; as well as the CAS, CIS and LACM).

CALOPTERYGIDAE

Calopteryx maculata (Beauvois). First listed for the state by Calvert (1895) on the basis of a CAS specimen from "California." The species otherwise is known from eastern North America west to Manitoba and Texas with an isolated population in Montana and is unlikely to occur naturally in California (Johnson, 1974).

LESTIDAE

Lestes alacer Hagen. We have found no other reference to this species in California and are unable to trace the source of Smith and Pritchard's (1956) listing of it. It is a Middle American species, known from Texas, New Mexico and Arizona in the United States (Needham and Heywood, 1929).

COENAGRIONIDAE

Ischnura ramburi (Selys). *Agrion defixum* Hagen (1861), described from "northern California," was declared a synonym of *I. ramburi* by Calvert (1895), and this has been the basis of the subsequent listing of this species from California by other authors (Muttkowski, 1910; Smith and Pritchard, 1956). The species occurs in southern Baja California (Calvert, 1895) and in Sonora (DRP) but is not known from the United States west of Texas other than Hagen's (1861) record. It seems highly unlikely to occur in northern California if in the state at all.

AESHNIDAE

Aeshna constricta Say. This species, listed from California and Baja California by Calvert (1895, 1905), was thought to occur widely in the West until Walker's (1912) revision of the genus, in which it was made clear that western records referred to *A. palmata* and *A. umbrosa*. Subsequently, Kennedy (1917) described *A. walkeri*, which is the species that occurs in Baja California (CAS), and Paulson (1970) listed the first records of the redefined *constricta* from the Pacific states. Although Needham and Westfall (1955) and Smith and Pritchard (1956) continued to list it from California, we can find no definite records.

Aeshna verticalis Hagen. This species was listed from California by Calvert (1895) before Walker (1912) showed that western records of it should be attributed to *A. interrupta*. Ahrens (1938) again recorded it from California, this time from two specimens from Yosemite National Park. DRP has examined one of these (Dog Lake, 22 July 1936) in the collection of the park and found it to be *A. interrupta*. Thus there is no evidence that the eastern *A. verticalis* occurs west of Minnesota and Iowa (Needham and Westfall, 1955).

Gynacantha nervosa Rambur. This species has been listed from California by most faunal list compilers since Calvert (1905) cited a record from "California." *G. nervosa* is a tropical dragonfly, not known from elsewhere along the Mexico-United States border nor even from Baja California, and there is no typical breeding habitat (forest swamp) for it in California. If the specimens listed by Calvert were really from this state they could have been wanderers or wind-blown individuals from much farther south, but we would prefer to delete it from the state list until further evidence of its occurrence is at hand.

Triacanthagyna trifida (Rambur). This species parallels the preceding one in its history in California; although Smith and Pritchard (1956) did not actually list it, they illustrated its wings and presumably meant to do so. Since Calvert's (1905) original record, Williamson (1923) showed that *T. trifida* itself is restricted to the West Indies and southeastern United States, the similar *T. caribbea*, *T. ditzleri* and *T. satyrus* occurring on the Middle American mainland, whence any California individuals should originate. All of these species are unlikely to occur in California, based on the argument presented under *G. nervosa*.

GOMPHIDAE

Progomphus obscurus (Rambur). Although the California species of *Progomphus* was correctly listed as *P. borealis* by Smith and Pritchard (1956), other authors as recently as Needham and Westfall (1955) continued to list *P. obscurus* from the state. The latter is an eastern species, and there is no recent record of it from west of Texas. Probably the Oregon, Wyoming and Baja California records in Needham and Westfall (1955) all refer to *borealis*.

MACROMIIDAE

Macromia pacifica Hagen. This species was recorded from California by Williamson (1900), with no further data. The record was questioned by Needham and Westfall (1955) and Smith and Pritchard (1956), and the species should be deleted from the state list until further evidence is forthcoming. It has been recorded from Nevada (La Rivers, 1941) but is otherwise unknown west of Kansas and Texas (Needham and Westfall, 1955). *Macromia* are notoriously difficult to determine, and Cruden (1969) has questioned the identification of specimens of *Cordulegaster* from Nevada by La Rivers in the same paper. *Macromia magnifica*, which occurs widely in the West, is quite variable (Paulson, ms.).

LIBELLULIDAE

Dythemis velox Hagen. This species was listed from California by Muttkowski (1910). Ris (1916) subsequently showed that the name *velox* as previously used was a composite of four species, all of which occur at least as far north as northern Mexico. No member of this genus has been taken subsequently in California, although *D. nigrescens* and *D. sterilis* occur in Baja California. Until further evidence is at hand, no species of *Dythemis* should be considered a member of the odonate fauna of the state.

Erythrodiplax funerea (Hagen). This species is the only one on the "deletion list" actually represented by a specimen with specific locality data, in this case "Lagomito" (probably Lagunita), Stanford University Campus, Santa Clara County (Calvert, 1906). We suggest the record is in error, as the nearest known populations occur in southern Arizona and Sonora, Mexico (Needham and Westfall, 1955). As discussed under *G. nervosa*, it is possible this individual was a wanderer or windblown, but there has been no further evidence to indicate *E. funerea* as a resident of the state.

Lepthemis simplicicollis (Say). Both Needham and Westfall (1955) and Smith and Pritchard (1956) list this species from California, probably based on the listing of the "subspecies" *collocata* from the state by various authors (e.g., Muttkowski, 1910). Gloyd (1958) showed that *collocata* and *simplicicollis* are distinct species, occurring sympatrically in west Texas and easily distinguishable in the hand. There is no evidence that *simplicicollis* occurs west of the Great Plains (Paulson, 1970). Walker and Corbet (1975) persisted in using the name *simplicicollis* for British Columbia populations, although they acknowledged the question as open. Subsequently, Robert Cannings has examined all of the specimens of this genus collected in British Columbia and determined them as *collocata* (*in litt.*, 12 July 1976).

Pseudoleon superbus (Hagen). First listed by Muttkowski (1910) for California, there is no further evidence of its occurrence. The confusion about this species, as well as others previously discussed, may have come about by the labelling of specimens from Baja California as merely "California."

Discussion

Table 1 lists all the species of Odonata believed by us to occur in the three Pacific states. Names of species, where they differ from

TABLE 1

List of the Odonata of the Pacific States

	Wash.	Ore.	Calif.
CALOPTERYGIDAE			
<i>Calopteryx aequabilis</i>	x	x	x
<i>Hetaerina americana</i>			x
LESTIDAE			
<i>Archilestes californica</i>	x		x
<i>A. grandis</i>			x
<i>Lestes congener</i>	x	x	x
<i>L. disjunctus</i>	x	x	x
<i>L. dryas</i>	x	x	x
<i>L. stultus</i>			x
<i>L. unguiculatus</i>	x	x	x
COENAGRIONIDAE			
<i>Amphiagrion abbreviatum</i>	x	x	x
<i>Anomalagrion hastatum</i>			x
<i>Argia agrioides</i>			x
<i>A. alberta</i>			x
<i>A. emma</i>	x	x	x
<i>A. hinei</i>			x
<i>A. lugens</i>		x	x
<i>A. moesta</i>			x
<i>A. nahuana</i>			x
<i>A. sedula</i>			x
<i>A. vivida</i>	x	x	x
<i>Coenagrion resolutum</i>	x	x	x
<i>Enallagma anna</i>		x	x
<i>E. basidens</i>			x
<i>E. boreale</i>	x	x	x
<i>E. carunculatum</i>	x	x	x
<i>E. civile</i>			x
<i>E. clausum</i>	x	x	x
<i>E. cyathigerum</i>	x	x	x
<i>E. ebrium</i>	x		
<i>E. praevarum</i>			x
<i>Ischnura barberi</i>			x
<i>I. cervula</i>	x	x	x
<i>I. denticollis</i>		x	x
<i>I. erratica</i>	x		x
<i>I. gemina</i>			x
<i>I. perparva</i>	x	x	x
<i>Nehalennia irene</i>	x		x
<i>Telebasis salva</i>			x
<i>Zoniagrion exclamationis</i>			x
PETALURIDAE			
<i>Tanypteryx hageni</i>	x	x	x
AESHNIDAE			
<i>Aeshna californica</i>	x	x	x
<i>A. canadensis</i>	x		
<i>A. constricta</i>	x		
<i>A. eremita</i>	x		
<i>A. interrupta</i>	x	x	x
<i>A. juncea</i>	x	x	
<i>A. multicolor</i>	x	x	x
<i>A. palmata</i>	x	x	x
<i>A. tuberculifera</i>	x		
<i>A. umbrosa</i>	x	x	x
<i>A. walkeri</i>		x	x
<i>Anax junius</i>	x	x	x
<i>A. walsinghami</i>			x

TABLE 1 (cont'd.)

List of the Odonata of the Pacific States

	Wash.	Ore.	Calif.
GOMPHIDAE			
<i>Erpetogomphus compositus</i>	x	x	x
<i>E. lampropeltis</i>			x
<i>Gomphus graslinellus</i>	x		
<i>G. intricatus</i>			x
<i>G. kurilis</i>	x	x	x
<i>G. olivaceus</i>	x	x	x
<i>G. plagiatus</i>			x
<i>Octogomphus specularis</i>	x	x	x
<i>Ophiogomphus bison</i>		x	x
<i>O. morrisoni</i>		x	x
<i>O. occidentis</i>	x	x	x
<i>O. severus</i>	x	x	x
<i>Progomphus borealis</i>		x	x
CORDULEGASTRIDAE			
<i>Cordulegaster dorsalis</i>	x	x	x
MACROMIIDAE			
<i>Macromia magnifica</i>	x		x
CORDULIIDAE			
<i>Cordulia shurtleffi</i>	x	x	x
<i>Epithea canis</i>	x	x	x
<i>E. spinigera</i>	x		x
<i>Somatochlora albicincta</i>	x	x	x
<i>S. minor</i>	x		
<i>S. semicircularis</i>	x	x	x
<i>S. walshi</i>	x		
LIBELLULIDAE			
<i>Brachymesia furcata</i>			x
<i>Brechmorhoga mendax</i>			x
<i>Lepthemis collocata</i>	x	x	x
<i>Leucorrhinia glacialis</i>	x		x
<i>L. hudsonica</i>	x	x	x
<i>L. intacta</i>	x	x	x
<i>L. proxima</i>	x		
<i>Libellula comanche</i>		x	x
<i>L. composita</i>			x
<i>L. croceipennis</i>			x
<i>L. forensis</i>	x	x	x
<i>L. julia</i>	x		x
<i>L. luctuosa</i>			x
<i>L. lydia</i>	x	x	x
<i>L. nodisticta</i>		x	x
<i>L. pulchella</i>	x	x	x
<i>L. quadrimaculata</i>	x	x	x
<i>L. saturata</i>		x	x
<i>L. subornata</i>		x	x
<i>Macrodiplax balteata</i>			x
<i>Orthemis ferruginea</i>			x
<i>Pachydiplax longipennis</i>	x		x
<i>Paltothermis lineatipes</i>			x
<i>Pantala flavescens</i>			x
<i>P. hymenaea</i>	x	x	x
<i>Perithemis intensa</i>			x
<i>Sympetrum corruptum</i>	x	x	x
<i>S. costiferum</i>	x	x	x
<i>S. danae</i>	x	x	x

TABLE 1 (cont'd.)

List of the Odonata of the Pacific States

	Wash.	Ore.	Calif.
<i>S. illotum</i>	x	x	x
<i>S. internum</i>	x	x	x
<i>S. madidum</i>	x	x	x
<i>S. obtrusum</i>	x	x	x
<i>S. occidentale</i>	x	x	x
<i>S. pallipes</i>	x	x	x
<i>S. vicinum</i>	x		
<i>Tramea lacerata</i>	x		x
<i>T. onusta</i>			x
TOTAL SPECIES	70	62	102

common usage in the literature, are based on information to be discussed elsewhere (Paulson, ms.). Oregon remains relatively *terra incognita*, as indicated by the nine species recorded from Washington and California but not in between. Most of these gaps (all but *Nehalennia irene*) have been filled in by the work of Schuh (1936) in his unpublished thesis on the Odonata of Oregon, but we have left this work entirely uncited pending examination of his specimens.

That this paper adds to the knowledge of the distribution of 55 of the 113 species (49%) of Odonata that occur in these states is indicative of the primitive state of distributional knowledge for these states; the same is true for most of the West. However, it is clear that not only were/are there gaps in distribution to be filled in by further collecting, but also some species are actively extending their ranges. The only differences we have been able to document are those between the time of Kennedy (1915, 1917) and our own observations, but some of these are marked. The following species have certainly spread in the Pacific states since Kennedy's time: *Enallagma civile*, *Libellula luctuosa*, *Pantala hymenaea* and *Tramea lacerata*. The last species, not discussed above, was not reported from Washington by Kennedy (1915) but now occurs in areas he studied intensively in Yakima County and is abundant in the Columbia Basin (Paulson, 1970, and further observations). All of these changes are probably consequences of human alteration of the landscape, in particular damming and irrigating. These activities furnish standing water in great quantities, and some odonates, in particular the opportunistic *Pantala* and *Tramea*, are rapid colonizers.

A group of species first reported from southeastern California herein is more difficult to analyze. This group includes *Anomalagrion hastatum*, *Enallagma basidens*, *Gomphus plagiatus* and *Macrodiplax balteata*. All these species are associated with irrigation water, and

they may be present because of the extensive modification of the Colorado River valley. Two alternative hypotheses are less satisfactory to us: that the species formerly occurred at the Colorado River itself or that the new records are attributable to insufficient collecting in the past.

Many species of odonates have become rare or extinct locally in the Pacific states because of human activities: damming or polluting rivers, draining marshes, introduction of predators such as trout or foulers such as carp. Happily, we can find no evidence of any severe contractions of ranges of any species in this region, although one species, *Ischnura gemina* of the San Francisco Bay area, has remained poorly known and may be on the verge of extinction.

We have concentrated considerable effort along the northern border of Washington and the southern and eastern borders of California, where we would expect peripheral species to occur. Based on their known distributions very few additional species might occur in these border areas. Otherwise, we believe the present list is reasonably complete and is a good indication of the diversity of the odonate fauna in this region.

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